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THE
CROOKED STREET

TRAFFIC STUDY REPORT

by: tom folks & amanuel haile
August 22, 2000

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INTRODUCTION

This report presents the results of San Francisco's "Crooked Street" Task Force meetings, results of various traffic-related studies performed on and around the crooked street, and DPT's staff recommendation addressing the problems concerning the "crooked street." As a major landmark, the crooked street, the 1000 block of Lombard Street, attracts a large number of motorist sightseers. Over the years, many residents have complained about the excess number of vehicles in the neighborhood.

On April 21, 1999, a small neighborhood Task Force was formed to address traffic problems related to the crooked street. The Task Force oversaw various studies and discussed issues of restricting traffic on the crooked street. This report presents the results. Following this introduction, there is a background section that discusses the formation of the Task Force. The methodology used to evaluate the concerns addressed by the residents is then discussed. This is followed by a summary of various traffic-related study results and their analysis. Finally, we present our recommendations about what the next steps should be. We also have a separate, technical appendix showing various summaries of the studies and survey data.

BACKGROUND

On January 19, 1999, the staff of the Department of Parking and Traffic presented postcard survey results about traffic problems related to the crooked street to San Francisco's Parking and Traffic Commission. DPT staff recommended forming a small neighborhood task force to address the following issues:

- Vehicular traffic capacity and area bottlenecks;
- Excessive vehicular traffic and parking demand;
- The possibility of a shuttle service;
- A pedestrian traffic movement and pedestrian accident study;
- The need for more Traffic Control Officers on Weekends and Holidays with longer working hours;
- The effectiveness of traffic control signs;
- Air pollution and Noise pollution;
- Restricting traffic on the crooked street.

The Task Force was composed to balance the opinion of members between those favoring restriction of the crooked street and those who oppose or are uncertain about how it should be accomplished. The size of the Task Force was also limited to facilitate meeting coordination and to allow everyone a chance to participate. Representatives from DPT's Enforcement Division and the Police Department's Central Station and Traffic Bureau were also invited to be on the Task Force.

On February 2, 1999, the Department of Parking and Traffic sent out letters inviting Russian Hill residents to participate on the Task Force. The rationale for the Task

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Force selection can be explained in terms of the residents' proximity to the crooked street, their position on restricting traffic, and their ability to represent different points of view in the neighborhood. The goal of the Task Force is to make recommendations to the Parking and Traffic Commission. Originally, the Task Force was formally balanced between residents favoring a crooked street restriction and residents who were either against or undecided towards such action. As time went on, the formal structures were relaxed, with the following residents' participating on the Task Force:

1. Ms. Shirley Bates, (a former Russian Hill Neighbors' Transportation Chairperson,)
2. Mr. Greg Broundage (resident of the 1000 block of Lombard Street)
3. Ms. Lucretia Rauh (Russian Hill Neighbors' Transportation Chairperson,)
4. Mr. Elton L. Puffer (resident of the 1000 block of Lombard Street)
5. Ms. Frances Bak-Brundage, (representing the Montclair Terrace Association)
6. Mr. Andrew Bacigalupi (resident of Montclair Terrace)
7. Mr. Janis Olvarado (resident of the 1000 block of Lombard Street)
8. Ms. Sandra Gulli (resident of the 2600 block of Larkin Street)
9. Ms. Julie Mayberry (resident of the 2700 block of Larkin Street)
10. Mr. Anthon Bruehl (resident of the 1600 block of Hyde Street)
11. Dr. Robert Brown (resident of the 1000 block of Lombard Street)

The following are city employees who participated in the task force:

Captain Culop Goldberg, SFPD Central Station
Captain Tony Novello, DPT Enforcement
Lieutenant Don Carlson, SFPD Traffic Bureau
Richard Lee, DPH, Senior Industrial Hygienist
Tom Rivard, DPH, Noise Pollution Expert
George Bowie, MUNI Cable Car Division
Andrew Saltzman, MUNI Cable Car Division
Michael Cronbach, MUNI Railway Service Planning

The following DPT staff organized and chaired the crooked street task force meetings, performed various studies and are responsible for this final report:

1. Tom Folks, Senior Transportation Engineer
2. Amanuel Haile, Assistant Transportation Engineer

The Task Force meetings were conducted informally and were intended to be restricted to one hour. Public comment periods were held at the end of each meeting to allow non-Task Force members who wished to speak. The members identified, discussed, measured and quantified problems related to the crooked street in accordance with state and city design/operation standards

METHODOLOGY

The vehicular and pedestrian problems related to the crooked street were addressed using a Systems Analysis approach. Systems Analysis is a method of breaking down a problem into its component parts, understanding the constraints and developing solutions step by step. DPT staff, at the first Task Force meeting (April 21, 1999) handed out a list of vehicular and pedestrian traffic problems as perceived by Russian Hill residents (from the 1998 crooked street postcard survey.) The list was discussed to determine which problems could be studied and quantified. Task Force members agreed on the problem-area boundaries, as shown in Figure1.

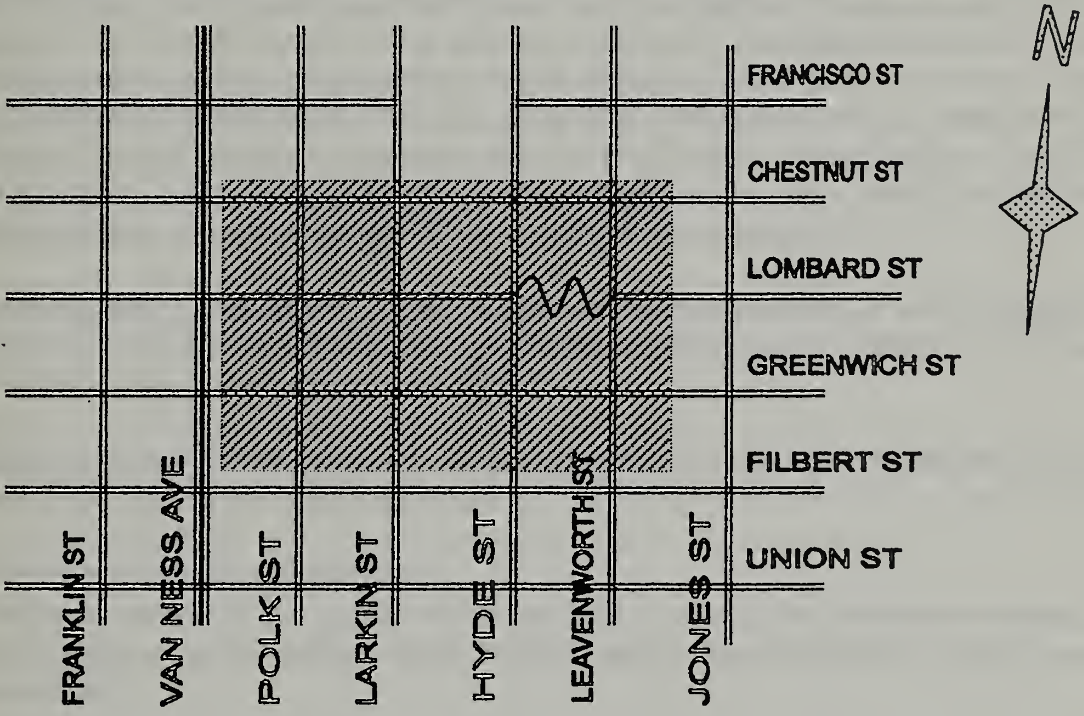


Figure I. ▨ Traffic Condition Study Area

SUMMARY OF PROBLEMS

DPT staff conducted traffic volume counts, observed motorist and pedestrian behavior and obtained speed, license plate and accident data. Radar and traffic counters were used to measure speed and traffic volumes and a video camcorder was used to record the license plates. DPT staff also compiled accident data from the Police Department's Collision Reports.

In addition, DPT staff monitored the following locations for driveway access delay and blockages:

1. Lombard Street, between Van Ness Avenue and Hyde Street
2. Montclair Terrace

3. Hyde Street, between Lombard and Chestnut Streets
4. 1001 and 1002 Lombard Street
5. Leavenworth Street, between Chestnut and Filbert Streets

In general the Task Force agreed that access to driveways was not a major concern. However there is an ongoing nuisance of the driveways at the base of the crooked street being blocked for short periods by people who park their cars to take photographs.

The task force discussed the violation of the tour bus restriction on Chestnut and Larkin Streets. The frequency of tour buses and the number of passengers were monitored. DPT staff found that the tour bus restriction is violated occasionally. DPT staff has asked task force members to report violators of tour bus restrictions. DPT staff, once the violators are identified, would write a letter and inform violators of the restriction. Repeat violators would be reported to SFPD for further action. The Task Force members inquired if DPT officers can enforce the tour bus restriction by issuing citations. At the moment, only SFPD can cite tour bus violations.

Lack of regulatory and advisory traffic signs was also discussed. It was suggested that DPT staff would investigate the use of State Park-style and Historical-style signs to be used in lieu of the regular traffic signs.

The high volume of traffic versus the capacity of the crooked street was discussed. DPT staff conducted the following studies:

- Bottlenecks and traffic backups
- Gridlock caused by pedestrians and vehicles. In particular pedestrians taking group pictures at the bottom of the crooked street causing traffic backups was monitored.

The following issues that involve MUNI were discussed:

- The possibility of eliminating or relocating the Hyde Street cable car stop at Lombard Street.
- The possibility of a new MUNI service connection from the #39 line.

The following issues associated with closure of a public street were discussed:

- **Legal Issue (Section 21101.6 of California Vehicle Code):** California Vehicle Code Section 21101.6 prohibits the closure of a public street to allow local access only. It is illegal to gate a public street to allow selective access for residents and exclude the general public. A previous senate bill of March 2, 1987, introduced by Senator Quentin Kopp was discussed. It was noted that this bill was never acted upon and expired. This bill would have amended Section 21101.6 of the Vehicle Code to allow

the crooked street to be gated.

- **Technical and Financial Issues:** Technical issues such as gate placement, delivery access, guest access and turnaround space, and financial issues regarding the costs of paying for street closure were addressed.

- **Consensus Among Neighbors:** The street closure will also require consensus among the neighbors. The majority of residents must agree that closing the street is the most appropriate solution.

RESULTS

Air Pollution Field Investigation Results

Mr. Richard Lee, Sr. Industrial Hygienist, from the DPH Environmental Health Division, and Amanuel Haile conducted measurements of air quality on July 3, 1999, at the Crooked Street. Measurements of carbon monoxide were taken (a major component of vehicle exhaust) at two locations. The first location was on the Crooked Street at Montclair Terrace. The other location was at the southeast corner of Lombard and Larkin Streets, 3 feet away from the curb. The sampling was conducted at a height of 5 feet.

Carbon monoxide was measured using two Industrial Scientific ATX0612 four gas monitors. The monitors were zeroed and calibrated for carbon monoxide testing prior to the measurements at a clean location. Confirmatory measurements were taken at the Larkin Street location using a Metrosonics 7700 carbon monoxide sensor. The meters were read and recorded every minute.

Measurements were taken at the Montclair Terrace site from 1:15 p.m. to 3:15 p.m. During this time, there was continuous vehicular traffic along Lombard Street from Van Ness Avenue to Leavenworth Street. During the measurement period there was a continuous wind of approximately 5-10 miles per hour.

At the Montclair Terrace location, carbon monoxide levels were between 0 and 1 part per million (ppm) for almost the entire measurement period. There was one spike that lasted less than one minute where the level reached 11 ppm. This may have been due to a vehicle with a faulty emission system. The average concentration during the measurement period was less than 1 ppm.

At the Larkin Street location, carbon monoxide levels were between 0 and 1 ppm for almost the entire measurement period. There were three peaks lasting 2-3 minutes, where levels reached 4 ppm. There were two other peaks lasting 2-3 minutes where levels reached 8 ppm and 14 ppm. Again, these peaks were probably due to older cars with faulty emission systems. The Metrosonics meter confirmed these measurements. The average concentration during the measurement period was less

than 1 ppm.

There are no city ordinance or standards regulating vehicle exhaust. California has an ambient air quality standard allowing 9 ppm averaged over an 8 hour period or 20 ppm over 1 hour. The measurements taken at both locations were well below these standards. These measurements are also well below the occupational health safety standard of 25 ppm, averaged over 8 hours, 5 days a week. In addition, measurements were taken on a particularly busy day for vehicular traffic. Levels should be lower on lighter traffic days. The measurements indicate that vehicle exhaust in this area does not pose a public health hazard.

A previous study was performed on Saturday, August 22, 1997, at the request of a Russian Hill resident. A measurement of Carbon Monoxide was taken along the sidewalk on the 1200 block of Lombard Street from 2:20 PM to 5:00 PM, when cars were lined up waiting to go down the crooked street. Carbon Monoxide levels averaged 2-3 parts per million (ppm). Levels on the sidewalk averaged 5-10 ppm. This would not have exceeded the State standard. The measurements taken were also below the occupational health and safety standard of 25 ppm, averaged over 8 hours, 5 days a week.

In conclusion, the exhaust from the vehicles measured on and around the crooked street does not appear to pose a public health hazard.

Noise Pollution on and around the Crooked Street

Mr. Tom Rivard, noise pollution expert from the DPH Environmental Health Division, addressed the Task Force. Members of the task force noted various noise problems that they encountered. Noise associated with speeding vehicles, cars honking, pedestrians yelling, tire screeching and loud music from vehicles using the crooked street were identified as the major sources of noise pollution. Mr. Rivard noted that vehicle noise is regulated under California Vehicle Code Section 23130.5, and presently, heavy trucks and tour buses are prohibited on and around the crooked street. Therefore, vehicle noise measurements are not likely to reveal any unusual violations. Mr. Rivard stated that much of the identified noise pollution is regulated under the San Francisco Police Code, Article 29. The task force agreed that the noise pollution on and around the crooked street is difficult to quantify and is primarily a matter of enforcing existing laws.

Enforcement on and around the Crooked Street

Captain Goldberg of Central Police Station, Lieutenant Don Carlson of SFPD Traffic Company and Tony Novello of the DPT Enforcement Division addressed enforcement-related issues.

According to Captain Goldberg, the Central Station personnel besides enforcing traffic violations, is also engaged in street patrol and other functions. Central Station has

limited budget and staffing. More rigorous enforcement of vehicular movement on the crooked street is not feasible due to the need to direct enforcement resources to other areas, such as Fisherman's Wharf, Telegraph Hill and Coit Tower. In addition, since the majority of the visitors at the crooked street are tourists, enforcement will not have a lasting effect. Tourists are not regarded as repeat violators, hence, issuing citations to tourist is not likely to have lasting behavioral changes. However, SFPD Central Station will provide enforcement as deemed necessary given the availability of personnel.

According to Tony Novello of the DPT Enforcement Division, the DPT Enforcement Division assigns PCO's at the crooked street during the high tourist season. The money allocated for crooked street traffic control for the 1999 fiscal year was $17,000. This funds an overtime budget, since most of the traffic queues happen on the weekends and the PCO's must be paid overtime for their services. Due to the limited budget, the department provides PCO's to control traffic on and around the crooked street for about nine (9) weekends. The PCO's are assigned at Van Ness Avenue and Lombard Street, Polk and Lombard Streets, Larkin and Lombard Streets, and Hyde and Lombard Streets. Because this is an overtime-funded program, DPT must rely on PCO's to volunteer for this assignment. Due to various circumstances, such as a whistle-blowing restriction, irate behavior exhibited towards the PCO's by tourists and residents, the Enforcement Division has difficulty attracting experienced PCO's to volunteer for this program. In addition, labor restrictions prohibit the director and the supervisors from forcing more experienced PCO's to work overtime on this assignment.

MUNI's Cable Car:

There was a suggestion to relocate MUNI's cable car stop so that the cable car would not stop in the middle of the Hyde and Lombard Streets intersection (see Figure 2). When this happens, it aggravates the traffic backup along Lombard Street. According to George Bowie and Andrew Saltzman of MUNI's Cable Car Division relocating the northbound stop further south poses a safety issue. The cable cars must stop at the intersection of Hyde and Lombard Streets where a stop limit line is marked with an "XX". The limit line is marked at a location were the cable car operators can clearly see if there are any cable cars on Chestnut and Hyde Street located one block north of the intersection. For safety reasons only one cable car can be on this steep grade at a time.

DPT and MUNI investigated the possibility of rerouting MUNI's # 39-COIT line to service crooked street visitors. Currently the # 39 line services Fisherman's Wharf via Union Street to Telegraph Hill Boulevard up to Coit Tower. Providing a bus to service tourists to the crooked street could provide an alternate means of transportation other than driving, which in turn could reduce the number of vehicles driving the crooked street. MUNI staff, however, felt that this would overextend the running distance for this line and require additional busses and drivers. As an alternative, MUNI staff

suggested a wait-and-see approach, to see if the new F-line service, along with the cable car connection, might alleviate some of the vehicular traffic. Another suggestion would be to encourage the development of a shuttle service by a private operator.

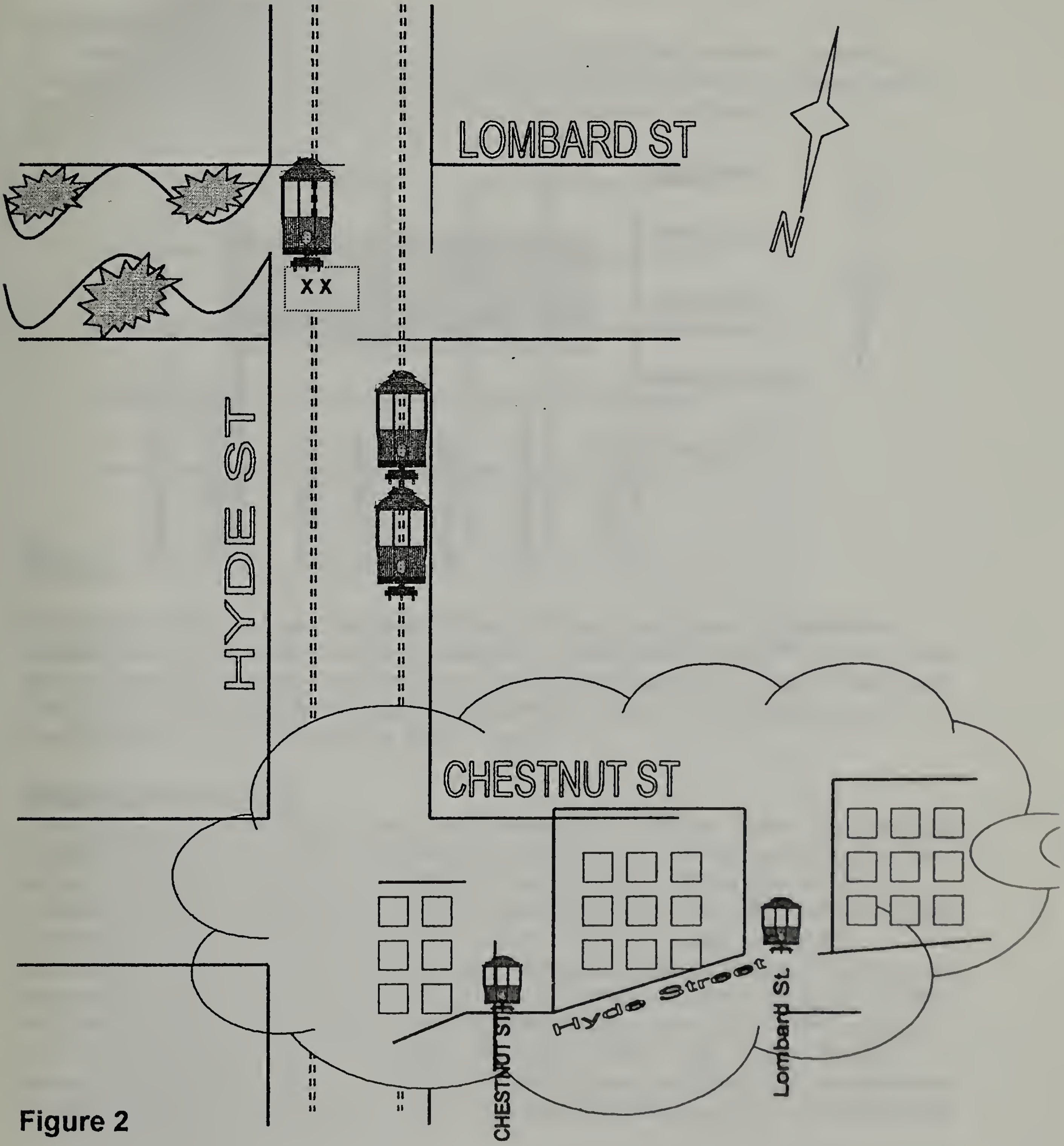


Figure 2

TRAFFIC STUDY

Existing conditions

The study area includes ten intersections on Lombard Street between Van Ness Avenue and Leavenworth Street and on Chestnut Street between Van Ness Avenue and Leavenworth Street. A map of the study area is shown in Figure 3.

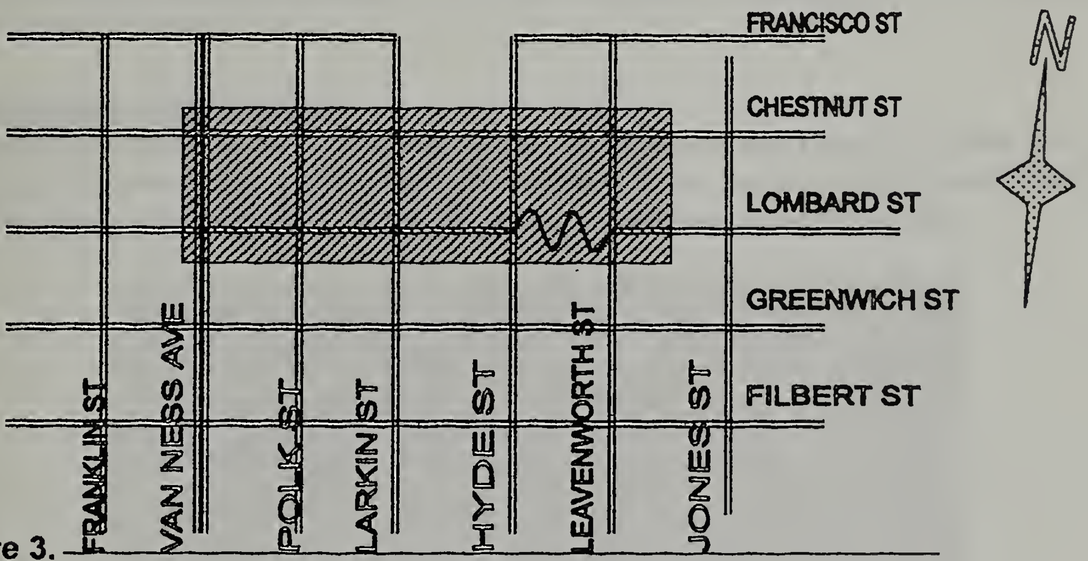


Figure 3.

According to the San Francisco Master plan, Lombard and Chestnut Streets are classified as neighborhood residential streets. Lombard Street is 44'-9" wide with one lane in each direction, between Van Ness Avenue and Hyde Street, and 15' wide with one lane eastbound between Hyde and Leavenworth Streets. Van Ness Avenue is classified as a major arterial in the Master Plan.

Existing traffic controls:

The intersections of Van Ness Avenue at Lombard and Chestnut Streets are controlled by traffic signals. The following intersections along Lombard Street are controlled by all-way STOP signs: Polk, Larkin and Leavenworth Streets. At the intersection of Lombard and Hyde Streets, eastbound Lombard Street and a northbound Hyde Street are controlled by STOP signs. The southbound Hyde Street approach at this intersection does not have STOP sign control because cable cars cannot stop on such steep hills (a cable car STOP sign exemption would also not work if cars have to stop in front of the cable car). There is a convex traffic safety mirror at this intersection to address safety and visibility for eastbound Lombard Street traffic. Along Chestnut Street, the all-way STOP sign- controlled intersections are at Larkin and Leavenworth Streets. All other intersections on Chestnut Streets are two-way STOP- controlled with STOP signs stopping Chestnut Street.

Existing parking regulations:
The residential streets in this area have a 2-hour parking limit for non-residents and unlimited parking for vehicles with a residential parking permit. These regulations are in effect from 8 A.M. to 9 P.M., Monday through Saturday. Parking is in high demand in the entire Russian Hill district.

Public transportation
MUNI line #19 provides service along the whole length of Polk Street located two blocks west of the crooked street and MUNI' s cable car runs along Hyde Street west of the crooked street.

Average Daily Traffic (ADT)
To determine the relative traffic volumes along Lombard and Chestnut Streets 24-hour traffic counts were obtained, as well as sample counts. Sample counts were factored to reflect 24-hour volumes. The results are summarized below on Table 1.

TABLE 1

Street Section	ADT
Lombard Street eastbound Between Van Ness and Polk	4078
Lombard Street eastbound between Polk and Larkin	3709
Lombard Street eastbound between Larkin and Hyde	3488
Lombard Street eastbound between Hyde and Leavenworth	1560
Chestnut Street westbound between Polk and Hyde	901

Significant trends
Table 1 reflects field investigations performed between May 9 and May 31, 1999. On weekends between 1:00 PM and 5:00 PM, northbound Van Ness Avenue traffic turning right to Lombard Street consistently blocked both eastbound Lombard Street through traffic and northbound Van Ness Avenue through traffic. The Van Ness Avenue blockages are particularly disruptive to MUNI. The highest traffic volumes in the study area occurred at Van Ness Avenue and Lombard Street during the Memorial Day weekend. During the Memorial Day weekend the following observation were made:

- Vehicular traffic capacity of the crooked street averages 350 vehicles per hour.
- The traffic volume on Lombard Street between Van Ness Avenue and Hyde Street exceeds the 350 vehicles per hour capacity from 12:00 noon to 9:00 p.m.
- The traffic delay for drivers waiting to go down the crooked street averages 35-40

minutes. This is the amount of time it takes a motorist to drive from Van Ness Avenue to Hyde Street along Lombard Street, a 3-block segment, about 1230 feet long.

Speed survey

In response to concerns expressed by a task force member regarding speeding along Chestnut Street between Leavenworth and Hyde Streets, a three-day 24-hour speed survey was performed on two different occasions. The existing speed limit is 25 miles per hour. The following is a summary of the speed survey results from May 27- May 30, 1999 and February 15, 16 and 26, 2000:

- The Average Speed of all the vehicles was 24.64 miles per hour
- The 85th Percentile Speed was 25.34 miles per hour.

The 85th percentile speed is the speed that 85% of drivers drive at or below. The 85th percentile speed is a common benchmark speed used to evaluate speeding conditions. 85th percentile speeds of up to 33 miles per hour are fairly common on streets with 25 mile per hour speed limits. The results for Chestnut Street show that the 25 mph limit is reasonable and being reasonably obeyed.

Speed measurements were not taken along Lombard Street since the congestion and the winding street geometry keeps speeds low. The crooked street itself has an advisory speed of 5 mph.

Pedestrian volumes

To estimate pedestrian volumes on and around the crooked street, 10-minute counts were conducted between 1:00 PM and 4:30 PM, on high tourist season weekends, when the pedestrian activity is highest. Table 2 summarizes the results of this survey performed from May 9- May 31, 1999.

TABLE 2 Side Street	Pedestrian Activity	# of Pedestrians crossing Lombard St (10 minute count)	# of Pedestrians crossing side street (10 minute count)
Leavenworth	High	62	48
Hyde	High	54	40
Larkin	Low	6	10
Polk	Low	3	7
Van Ness	Moderate	15	21

Significant trends

The highest volume of pedestrians crossing Lombard Street was measured at both Leavenworth and Hyde Streets with an average of 7 pedestrians per minute. The next

highest volumes were measured at Van Ness Avenue with an average of 5 pedestrians per minute. The pedestrian volumes at the rest of the study intersections ranged from 1 to 3 pedestrians per minute.

Overall Accident History

Traffic accidents on and around the crooked street were examined for the period from 1994 to 1998. The accident statistics were obtained from the San Francisco Police department's records of collision reports. Table 3 lists the accidents for the study area. Table 4 summarizes these accidents for various intersections.

TABLE 3: Accident types from 1994 to 1998 on and around the crooked street

INTERSECTION	DATE	LOCATION	TYPE
CHESTNUT & HYDE	08/14/1994	INTERSECTION	Head-on
CHESTNUT & HYDE	04/21/1995	INTERSECTION	hit object
CHESTNUT & POLK	01/04/1995	INTERSECTION	auto/ped
CHESTNUT & POLK	01/09/1996	INTERSECTION	auto/ped
CHESTNUT & POLK	08/01/1997	INTERSECTION	broadside
CHESTNUT & POLK	06/04/1998	INTERSECTION	sideswipe
GREENWICH & LEAVENWORTH	04/26/1998	MID-BLOCK	hit object
GREENWICH & POLK	02/04/1996	INTERSECTION	auto/ped
GREENWICH & POLK	02/27/1996	INTERSECTION	broadside
GREENWICH & POLK	09/05/1997	INTERSECTION	broadside
HYDE & GREENWICH	02/06/1994	MID-BLOCK	overturned
LOMBARD & HYDE	04/06/1994	INTERSECTION	hit object
LOMBARD & HYDE	09/16/1994	INTERSECTION	hit object
LOMBARD & HYDE	06/22/1996	INTERSECTION	broadside
LOMBARD & HYDE	03/14/1998	INTERSECTION	broadside
LEAVENWORTH & CHESTNUT	03/26/1995	MID-BLOCK	sideswipe
LEAVENWORTH & CHESTNUT	06/07/1996	MID-BLOCK	hit object
LEAVENWORTH & CHESTNUT	08/28/1998	MID-BLOCK	broadside
LOMBARD & LEAVENWORTH	10/26/1994	MID-BLOCK	hit object
LOMBARD & LEAVENWORTH	09/18/1994	MID-BLOCK	auto/ped
LOMBARD & POLK	01/061994	MID-BLOCK	other
LOMBARD & POLK	05/22/1995	INTERSECTION	broadside
LOMBARD & POLK	11/221995	INTERSECTION	rear-end
LOMBARD & POLK	11/201998	INTERSECTION	auto/ped
LOMBARD & VAN NESS	11/06/1994	INTERSECTION	auto/ped
LOMBARD & VAN NESS	03/05/1995	MID-BLOCK	rear-end
LOMBARD & VAN NESS	04/11/1995	INTERSECTION	broadside
LOMBARD & VAN NESS	06/28/1995	INTERSECTION	sideswipe
LOMBARD & VAN NESS	08/13/1995	INTERSECTION	broadside
LOMBARD & VAN NESS	10/19/1995	INTERSECTION	auto/ped
LOMBARD & VAN NESS	11/05/1995	MID-BLOCK	rear-end

TABLE 3: Continued
Accident types from 1994 to 1998 on and around the crooked street

ADDRESS	DATE	LOCATION	TYPE
LOMBARD & VAN NESS	01/15/1996	INTERSECTION	auto/ped
LOMBARD & VAN NESS	02/09/1996	INTERSECTION	rear-end
LOMBARD & VAN NESS	05/24/1996	INTERSECTION	auto/ped
LOMBARD & VAN NESS	08/11/1996	MID-BLOCK	rear-end
LOMBARD & VAN NESS	01/12/1997	INTERSECTION	rear-end
LOMBARD & VAN NESS	03/20/1997	INTERSECTION	broadside
LOMBARD & VAN NESS	07/06/1997	INTERSECTION	sideswipe
LOMBARD & VAN NESS	06/01/1998	INTERSECTION	hit object
LOMBARD & VAN NESS	06/07/1998	INTERSECTION	hit object
LOMBARD & VAN NESS	07/02/1998	INTERSECTION	hit object
LOMBARD & VAN NESS	10/26/1998	INTERSECTION	auto/ped
LOMBARD & VAN NESS	05/16/1994	INTERSECTION	rear-end
LOMBARD & VAN NESS	10/19/1994	MID-BLOCK	auto/ped
LOMBARD & VAN NESS	10/17/1996	MID-BLOCK	broadside
LOMBARD & VAN NESS	11/06/1996	MID-BLOCK	auto/ped

TABLE 4. Accident Totals from 1994 to 1998 on and around the crooked street

	NUMBER OF REPORTED ACCIDENTS					
INTERSECTION	1994	1995	1996	1997	1998	Total
LOMBARD/VAN NESS	7	6	6	3	4	26
LOMBARD/POLK	1	2	0	0	1	4
LOMBARD/LEAVENWORTH	1	1				2
LOMBARD/HYDE	2		1		1	4
GRENWICH/HYDE	1					1
GREENWICH/POLK			2	1		3
GREENWICH/LEAVENWORTH					1	1
CHESTNUT/POLK		1	1	1	1	4
CHESTNUT/LEAVENWORTH		1	1		1	3
CHESTNUT/HYDE	1	1				2
Totals	13	12	11	5	9	50

Significant trends:

Generally, the intersections with the highest number of Police reported accidents coincided with the intersections with the highest traffic volumes.

With a total of 26 accidents from 1994 to 1998, the intersection of Van Ness Avenue and Lombard Street had the most reported accidents among the intersections surveyed.

Another significant trend is the reduction in the total accidents in the four-year period from 1994 to 1998. Comparing the figures for 1994 vs. 1997, the total number decreased from 13 to 5 accidents, a reduction of almost 60 %.

Pedestrian Accident History:
In response to concerns about pedestrian safety on and around the crooked street, pedestrian accident statistics were also analyzed. Table 5 summarizes the pedestrian accidents in the study area from 1994 to 1998.

TABLE 5. Pedestrian Accidents from 1994 to 1998 on and around the crooked street

LOCATION	DATE	TYPE
CHESTNUT & POLK	01/04/1995	INTERSECTION
CHESTNUT & POLK	01/09/1996	INTERSECTION
GREENWICH & POLK	02/04/1996	INTERSECTION
LOMBARD near LEAVENWORTH	09/18/1995	MID-BLOCK
LOMBARD & POLK	11/20/1998	INTERSECTION
LOMBARD & VAN NESS	07/12/1994	INTERSECTION
LOMBARD & VAN NESS	09/27/1994	INTERSECTION
LOMBARD & VAN NESS	11/06/1994	INTERSECTION
LOMBARD & VAN NESS	10/19/1995	INTERSECTION
LOMBARD & VAN NESS	01/15/1996	INTERSECTION
LOMBARD & VAN NESS	05/24/1996	INTERSECTION
LOMBARD & VAN NESS	10/26/1998	INTERSECTION
VAN NESS near LOMBARD	10/19/1994	MID-BLOCK
VAN NESS near LOMBARD	11/06/1996	MID-BLOCK

Significant Trends:
Based on an analysis of the Police accident reports for these intersections, there appears to be a common pattern. The causes for accidents appear to be driver's inattention. The intersection of Lombard Street and Van Ness Avenue has the most reported pedestrian accidents from 1994 to 1998. Considering that Lombard Street at Leavenworth and at Hyde Streets have relatively heavy pedestrian activity, it is somewhat surprising that these intersections have had no reported pedestrian accidents.

License Plate Study:
DPT staff performed a license plate study during the Memorial Day weekend to determine the origin of the vehicles on the crooked street. According to the study, 41% of the vehicles were

from the greater Bay Area, 13% were from the city of San Francisco, and 40% were out of the Bay Area. Rented vehicles comprised only 6% of the total. Table 6 summarizes the origin of the vehicles that visited the crooked street during the Memorial Day weekend of 1999.

Table 6: Lombard Street License Plate Study

City where Vehicle is registered	Number of vehicles (10 minutes count)	% (Percentage)
San Francisco	16	13
Bay Area	51	41
Out of Bay Area	50	40
Total Rented vehicles	7	6

Recommendations

Suggestions to minimize traffic backup and bottlenecks

DPT staff has identified the intersections of Van Ness Avenue and Lombard Street, Lombard and Hyde Streets, and Lombard and Leavenworth Streets as the bottlenecks that contribute to the traffic backups along Lombard Street. Pedestrians taking group pictures at the top and bottom of the crooked street contribute to the traffic backups. In addition, any southbound Hyde Street traffic making an illegal left turn onto the crooked street can potentially block cable cars and other traffic.

As noted in this report there appears to be a significant problem at the Lombard Street and Van Ness Avenue intersection. This is caused in large part by the northbound Van Ness Avenue vehicles trying to turn right onto Lombard Street.

DPT recommends a part-time parking prohibition on the eastside of Van Ness Avenue, south of Lombard Street, to alleviate the queuing of traffic trying to access the crooked street. The parking prohibition would be in effect between the months of May and September, Friday to Sunday, including public holidays, from 9AM to 9PM.

DPT recommends increasing enforcement with Parking Control Officers (PCO's) at the above mentioned intersections. Although PCO's are not authorized to cite for moving violations, their presence provides an active deterrent, which in turn facilitates traffic movements. In addition, DPT recommends more nighttime police officer (SFPD) presence at the crooked street especially during the high-tourist season to enforce various noise-related infractions.
The Traffic Engineering Division recommends that the allocated budget for the Crooked Street traffic control be increased by at least 50% above the amount allotted for the 1999 fiscal year ($17,000).

Shuttle to serve the crooked street

To provide an alternative means of transportation other than driving, DPT recommends encouraging the development of a private shuttle service to the crooked street. Since buses and vans with a seating capacity over 8 passengers are prohibited on and around the crooked street, this service would require an exception to operate in this area.

Street Closure

Some Task Force members were strong advocates of closing the crooked street to non-residents. However, other Task Force members who are also residents along the crooked street, wanted to make it clear that they do not favor an exclusive gating arrangement. DPT reviewed the following issues relative to a non-resident street closing:

1. **Legal issue (Section 21101.6 of California vehicle Code):** California Vehicle Code Section 21101.6 prohibits the closure of a public street to allow local access only. Currently, it is illegal to gate a public street to allow selective access for residents and exclude the general public. The task force discussed a previous senate bill of March 2, 1987, introduced by Senator Quentin Kopp, which would have amended Section 21101.6 of the Vehicle Code. It was noted that the bill was never acted upon and expired

   Another option to circumvent this issue would be the privatization of the street. DPT staff does not advocate this approach; however, the property owners on the crooked street could make an offer to the city.

2. **Consensus among neighbors:** The street closure will also require consensus among the neighbors. The majority of residents must agree that closing the crooked street is the only solution for the traffic concerns on and around the crooked street. At the September 2, 1999 task force meeting, five out of the seven neighborhood residents in attendance expressed an interest in some sort of street closure restriction for the crooked street. DPT staff has also been informed that at the January 4, 2000 Russian Hill Neighborhood Director's meeting, the board voted in favor of closure. According to the 1998 DPT postcard crooked street survey, the idea of restricting traffic on the crooked street was supported by 55% of the residents while 17% did not support the idea, 31% said it depends on the specific proposal, and 28% did not respond at all. These responses had significant block-by-block variations. For example, 26% of the residents of the 1000 block Lombard Street support the idea of restricting through traffic and 37% oppose such a proposal. On Monticlair Terrace 13% support the idea of restricting through traffic and 38% oppose the idea.

3. **Technical and financial issues:** Gating has the following other issues requiring resolution: gate placement, delivery access, guest access, turnaround space, and

3. financial issues. These issues are discussed under the various design alternatives below:

__Street Closure Alternatives__

a. **Mid-block closure (see "PROPOSAL I" next page).** The crooked street is 15 feet wide with one-lane in the eastbound direction. If barriers were placed mid-block to discourage through access the street should be widened by 5 feet to accommodate two-way traffic according to modern design standards. The estimated construction cost for such a change would be $ 1.8 million. This proposal would have some turn-around problems. People making turn-arounds would have to use private driveways.

b. **Automatic gate (See "PROPOSAL II" following page).** This system uses a telephone entry system where residents of the crooked street use a remote control key to access their homes and non-residents (emergency vehicles and freight delivery) would use a telephone entry system. This type of automatic gate with electric power and phone line would cost about $50,000.

c. **Gate with security personnel (See "PROPOSAL III" following page).** An alternative gating arrangement would use part- time or full-time security personnel that would prohibit non-residents from accessing the crooked street at certain times of the day. The estimated cost of security personnel with a firearm is $24.00/hr/officer and with no firearm is $15.00/hr/officer. In this type of system a gate can be installed for about $19,000. This alternative would have the added benefit of providing security personnel to monitor other problems, such as noise.

d. **Signal System.** Another suggestion made at the Task Force meeting was to install a signaling system to alternate the one-way direction of the crooked street. This type of system would be complicated by the need to have signal indications provided for Monticlair Terrace and for the private driveways on the crooked street. The operation of the signal would be complicated by the need to provide for cable car pre-emption. This would likely lead to a dramatic capacity reduction on the crooked street, leading to more backups.

e. **Vacating the crooked street.** As mentioned previously converting the crooked street to a private street is one way to overcome the legal obstacles associated with gating a public street. This could be done by a street vacation process where the adjacent property owners would purchase the street. The procedure for vacating involves assessing the street value of the crooked street by the city's Real Estate agent and a third party hired by the residents. A street vacating permit must be obtained from the Department of Public Works and requires approval by the Board of Supervisors. Once the street is vacated, the residents of the crooked street would assume all responsibility including maintenance and repair costs.

Some task force members suggested converting Lombard Street between Larkin and

Polk Streets to one-way westbound. This would discourage through traffic movement. DPT staff noted a similar proposal was implemented in 1970. Predictably, traffic conditions improved on this portion of Lombard Street, but adjacent streets such as Francisco and Greenwich Streets bore the displaced traffic. After two months, the proposal was revoked when residents of adjacent streets protested.

DPT staff recommends additional Parking Control Officers and Police Officers to be assigned for the crooked street detail. In addition we recommend the closure of eastbound Lombard Street at Van Ness Avenue during the following high-tourist season weekends when vehicular traffic is especially high:

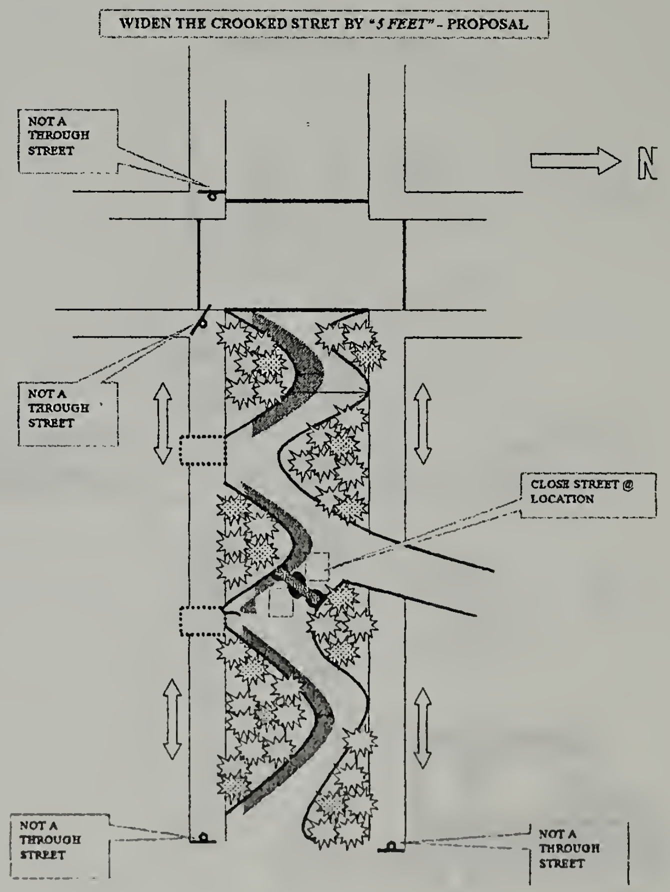
- Memorial Day Weekend
- July 4th Weekend
- Labor Day Weekend
- Columbus Day Weekend

According the California Vehicle Code, Section 21101.2 "Local Authority to Divert Traffic", " if the peace officer finds that a significant number of vehicles are not promptly moving when opportunity arises to do so, then the peace officer may divert vehicles, excepting public safety or emergency vehicles, from that street or highway, subject to traffic congestion until such time as reasonably flowing traffic is restored. DPT staff requested that the local authority, i.e, the Northern Police Station, give DPT Enforcement full authority to close eastbound Lombard Street between Van Ness Avenue and Polk Street.

Captain Alex Fagan, Commanding Officer of the Northern Police Station, in his memo dated August 9, 2000, has given the Department of Parking and Traffic, Enforcement Division, full authority to close as deemed necessary the 1300 block of Lombard Street, between Van Ness and Polk Street.

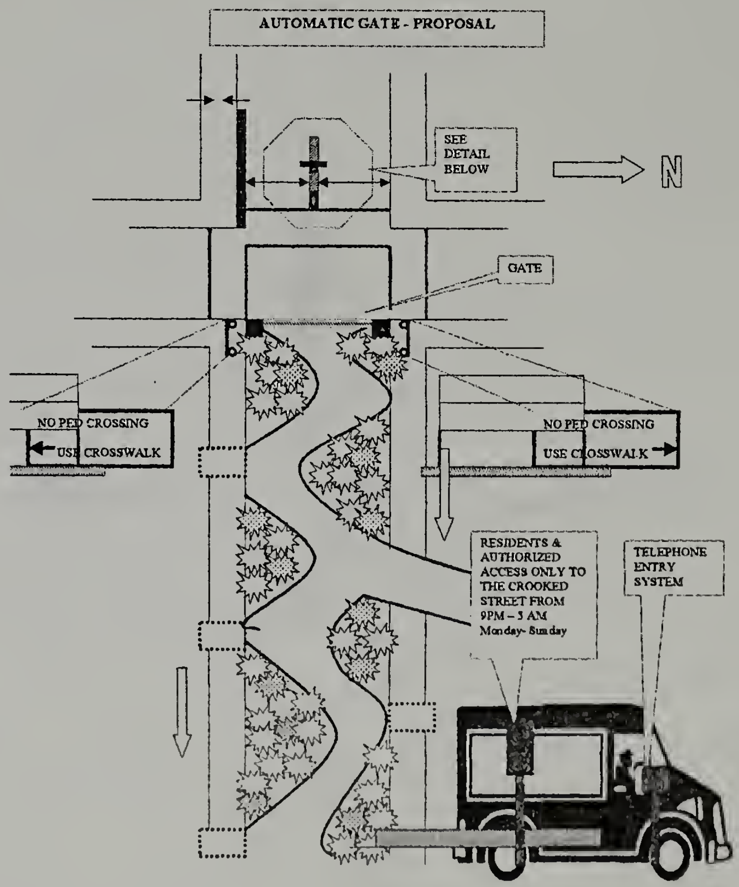
STREET CLOSURE OPTION I

- Mid-Block Closure
  - WIDEN THE CROOKED STREET BY 5 FEET
  - Street will be converted into a two-way regulation
  - Post not a through street signs
  - Estimated Construction cost = $ 1.8 million
  - Estimated construction duration 7 months



STREET CLOSURE OPTION II

- Entry - Closure I
  - automatic gate
  - built in time clock provides time zoned relay activation, part time open & shut down of gate loop detection
  - telephone entry system
  - residents use remote control key to access
  - cost (estimated)
    - $50,000 installed (includes electric power and phone)
    - $20,000 without (electric power and phone)


AUTOMATIC GATE - PROPOSAL
SEE DETAIL BELOW
N
GATE
NO PED CROSSING
USE CROSSWALK
NO PED CROSSING
USE CROSSWALK
RESIDENTS & AUTHORIZED ACCESS ONLY TO THE CROOKED STREET FROM 9PM – 5 AM Monday- Sunday
TELEPHONE ENTRY SYSTEM

STREET CLOSURE OPTION III

- Entry - Closure II
  - Gate with Security Officer
  - Part time or full time security officer
    - Armed : $24.00/hr/officer
    - Unarmed : $15.00/hr/officer
    - Gate with no telephone system = $19,000